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CMMI Today

Carnegie Mellon University, Software Engineering Institute, Pittsburgh, PA, 15213

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16. SECURITY CLASSIFICATION OF:
   a. REPORT
      unclassified
   b. ABSTRACT
      unclassified
   c. THIS PAGE
      unclassified

   17. LIMITATION OF ABSTRACT
       Same as Report (SAR)

   18. NUMBER OF PAGES
       47

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Standard Form 298 (Rev. 8-98)
Prepared by ANSI Std Z39-18
Brief History – CMMI

1992 – Software CMM created
1994 – Systems Engineering CMM created
1998 – CMMI Product Suite initiated
2001 – CMMI-SE/SW V1.0 released
2002 – CMMI-SE/SW/IPPD/SS V1.1 Product Suite released
2003 – 10,000 people trained in “Intro to CMMI;” 150+ SCAMPI benchmark appraisals in at least 12 countries; CMMI web site “hits” exceed 1M/month
CMMI Today

Stable Version 1.1 CMMI Product Suite was released January 2002.

Errata sheets cover known errors and changes with book publication.

FAQs are generated to cover broader issues.

Yahoo has CMMI Process Improvement and Lead Appraiser Group sites.

CMMI web pages hits have surpassed 1M/month.

Change Request announcement addressed 90 day review period through Dec 12.
SW-CMM v1.1 vs. CMMI Process Areas

**LEVEL 5**
- Defect Prevention
- Technology Change Mgmt
- Process Change Management
- Causal Analysis and Resolution
- Organizational Innovation & Deployment

**LEVEL 4**
- Quantitative Process Mgmt
- Software Quality Mgmt
- Organizational Process Performance
- Quantitative Project Management

**LEVEL 3**
- Organization Process Focus
- Organization Process Definition
- Training Program
- Integrated Software Mgmt
- Risk Management
- Requirements Development
- Technical Solution
- Product Integration
- Verification
- Validation
- Decision Analysis and Resolution

**LEVEL 2**
- Requirements Management
- Software Project Planning
- Software Project Tracking & Oversight
- Software Subcontract Mgmt
- Software Quality Assurance
- Software Configuration Mgmt
- Project Planning
- Project Monitoring and Control
- Supplier Agreement Management
- Product & Process Quality Assurance
- Configuration Management
- Measurement and Analysis
CMMI Improvements over the CMM

Emphasis on measurable improvements to achieve business objectives. Process areas have been added to place more emphasis on some important practices:
  • Risk Management
  • Measurement and Analysis
  • Engineering Process Areas
  • Decision Analysis
Adoption—What else is happening now?

Publication of SEI Series Book with Addison-Wesley: others include:

- CMMI Distilled: Second Edition
- Balancing Agility and Discipline

Annual NDIA/SEI CMMI User Workshop
- Denver Hyatt Technical Center
- Nov 17-20
  400+ attendees

Mappings taken on by IEEE
How about SEI Publications?

Technical notes and special reports:
• Interpretive Guidance Project: Preliminary Report
• CMMI and Product Line Practices
• CMMI and Earned Value Management
• Interpreting CMMI for Operational Organizations
• Interpreting CMMI for COTS Based Systems
• Interpreting CMMI for Service Organizations
• Providing Safety and Security Assurance (in progress)
• Interpreting CMMI for Acquisition (in progress)
CMMI Transition Status

As of 12/31/03

Training

Introduction to CMMI – 10103 trained
Intermediate CMMI – 777 trained
Introduction to CMMI Instructors – 219 trained
SCAMPI Lead Appraisers – 379 trained

Authorized

Introduction to CMMI V1.1 Instructors - 176
SCAMPI V1.1 Lead Appraisers – 267
Number of CMMI Students Trained (Cumulative)
Intro to the CMM and CMMI Attendees (Cumulative)
Number of Assessments Reported to the SEI by Year
30 September 2003

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CMMI® Results Study Framework

Costs
- Investment in Improvement
- Costs of Improvement
- Operational Costs

Benefits / Savings / Improvements
- Process Capability or Maturity
- Quality
  - Schedule / cycle time
  - Predictability
  - Product cost
  - Customer satisfaction
- Rework
  - Effort
  - Productivity
  - Enhanced functionality
  - "ilities"
  - Employee morale
  - Process compliance

Cost of quality / ROI

+ REVENUE / SAVINGS

- COSTS / EXPENSES

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Boeing, Australia

Making transition to CMMI from SW-CMM and EIA 731; early CMMI pilot in Australia

**RESULTS** on One Project

- 33% decrease in the average cost to fix a defect
- Turnaround time for releases cut in half
- 60% reduction in work from Pre-Test and Post-Test Audits; passed with few outstanding actions

- Increased focus on product quality
- Increased focus on eliminating defects
- Developers seeking improvement opportunities

In Processes is there a Pay-Off? Terry Stevenson, Boeing Australia, Software Engineering Australia 2003 conference.
Lockheed Martin M&DS

Results

- Award Fees during 2002 are 45% percent of unrealized award fees at ML2

1996 - 2002

- Increased software productivity by 30%
- 16% reduction in Dollars/KLOC
- Decreased defect find and fix costs by 15%

Internal data shared through Collaboration; August 2003.
General Motors Corporation

CMMI focus 2001
Goal is Integration of Supplier Work & GM Project Execution

Results:
• Improved schedule – projects met milestones and were fewer days late


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Aggregated Appraisal Results

Results from 18 Defence Community* appraisals conducted over the period Mid 2000 - Present
- *Includes Defence Industry and Department of Defence appraisal results

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The Road Ahead....

Formal Review period ends mid-December

CMMI Team will review CRs to determine possible Change Packages for a V1.2 of model and/or method

CCB will determine which CPs, if any, are needed (stability goal remains)

Improvement Packages would be an FY 05 effort, with piloting

V1.2 would be ~FY 06
CMMI Staged and Six Sigma

1. 6σ may drive toward and accelerate CMMI solution
   - 6σ “drilldown” drives local (but threaded) improvements
   - 6σ philosophy & method focus

2. 6σ used within CMMI efforts
   - Correlation between process areas & 6σ methods

3. Infrastructure in place
   - Defined processes feed 6σ

4. Process measured and controlled
   - Defined
   - Quantitatively Managed

5. Process unpredictable and poorly controlled
   - Optimalizing

Six Sigma is enterprise wide.
Six Sigma addresses product and process.
Six Sigma focuses on “critical to quality” factors.

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Six Sigma and CMMI Continuous

Achieve high capability in PAs that build Six Sigma skills.
- MA, QPM, CAR, OPP

Use capability to help prioritize remaining PAs

Remaining PAs ordered by business factors, improvement opportunity, etc. which are better understood using foundational capabilities. CMMI Staged groupings and DMAIC vs. DMADV are also factors that may drive the remaining order. [Vickroy 03]

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LMC M&DS Process Standard Roadmap

Program Process Standard

CMMI SE/SW v1.1

ISO 9001 - 2000

EIA 632 - 1999

ISO/IEC 12207 - 1995

Six Sigma links:
Level 2 Measurement & Analysis PA, Level 4/5 PAs

[S-P 03]
Six Sigma Approach at Northrop Grumman

Linked with Business Planning and Oversight
- Business planning
- Project selection

Enabled by Infrastructure
- Training
- Tools
- Awareness
- Database

Quantitatively Driven
- Six Sigma improvements are quantified

Tied to Employee Performance
- Goals, awards
- Job and career paths

Integrated with Quality Program
- Integrated Training, Awareness, & Policies
- Integrated CMMI & Six Sigma projects
- Integrated tracking and reporting via DB, PRA, etc.

Engaged with External Customers
- Visibility
- Participation

StartIt! – a NGMS product

Minitab.Ink
Northrop Grumman’s Six Sigma Implementation

Started implementing Six Sigma in 2001
Trained over 3000 Green Belts (80 hours), and over 200 Black Belts (160 hours)
Completed several hundred projects covering all functional areas
  • Customer involvement and award fee citations
About half of the projects are improving an engineering process
Six Sigma is a business strategy to deliver value and develop a sustainable competitive advantage.

KM provides a strategy to utilize data and transform it into knowledge to enable informed and decisive management leadership.

CMMI provides guidance for measuring, monitoring and managing processes.
Outline

Introduction

Current Status

Summary

Terms used in this Briefing

How to Report your Appraisal Results to the SEI
Introduction: Purpose

Characterize the adoption of the CMMI

Describe results from Standard CMMI Appraisal Method for Process Improvement (SCAMPI v1.1) Class A appraisals using Capability Maturity Model Integration (CMMI) v1.1 *

Encourage continued reporting of results

* Organizations previously appraised against CMMI v1.0 and who have not reappraised against v1.1 are not included in this report

Please visit: http://www.sei.cmu.edu/sema/profile_about.html for additional information or questions you may have about this briefing before contacting the SEI directly
Current Status

SCAMPI v1.1 appraisals conducted since April 2002 release through October 2003 and reported to the SEI by

- **136** appraisals
- **123** organizations
- **68** participating companies
- **11** reappraised organizations
- **520** projects
- **44%** offshore organizations

Please refer to: Terms Used in this Report on page 21
Reporting Organizational Types - 1

- Commercial/In-house: 49.6%
- Contractor for Military/Government: 44.7%
- Military/Government Agency: 5.7%

Based on 123 organizations

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Reporting Organizational Types - 2

Based on 123 organizations

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Types of Organizations
Based on Primary Standard Industrial Classification (SIC) Code

Based on 63 organizations reporting SIC code. For more information visit: http://www.osha.gov/oshstats/sicser.html
Organization Size
Based on the total number of employees within the area of the organization that was appraised

Based on 122 organizations reporting size data

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Use of Model Representations in Appraisals

Based on 136 appraisals
Disciplines Selected for Appraisals

Based on 136 appraisals reporting coverage.

SW = Software Engineering
SE = System Engineering
SS = Supplier Sourcing
IPPD = Integrated Product and Process Development
Summary Organizational Maturity Profile

Based on most recent appraisal of 87 organizations reporting a maturity level rating

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Maturity Profile by Organizational Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Commercial/In-house</th>
<th>Contractor for Military/Government</th>
<th>Military/Government Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>14.3%</td>
<td>8.3%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Managed</td>
<td>28.6%</td>
<td>13.9%</td>
<td>13.9%</td>
</tr>
<tr>
<td>Defined</td>
<td>50.0%</td>
<td>18.4%</td>
<td>18.4%</td>
</tr>
<tr>
<td>Quantitatively Managed</td>
<td>55.6%</td>
<td>6.1%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Optimizing</td>
<td>50.0%</td>
<td>32.7%</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

Based on most recent appraisal of 87 organizations reporting organization type and a maturity level rating.
Countries Where Appraisals Have Been Performed and Reported to the SEI

Australia Canada China Colombia France India Japan Korea, Republic of Russia Switzerland Taiwan United Kingdom United States
USA and Offshore Summary
Organizational Maturity Profiles

Based on 33 U.S. organizations and 54 offshore organizations reporting their maturity level rating
Based on the number of appraisals listed above that rated the process area
Based on the number of appraisals listed above that rated the process area.

11 of the 83 appraisals rating IPM also examined the IPPD goals. 10 of these 11 appraisals satisfied IPM with the IPPD goals.

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Based on the number of appraisals listed above that rated the process area:

- OPP: 37 appraisals
- QPM: 36 appraisals
- OID: 28 appraisals
- CAR: 30 appraisals
Based on 12 appraisals reporting a maturity level rating

* None of the 14 appraisals selected the IPPD discipline
Based on **22** appraisals reporting a maturity level rating

* 1 of the 22 appraisals rating IPM also examined the IPPD goals. That appraisal satisfied IPM.
Summary

Relatively even reporting from the Commercial and Contractor communities, however Commercial organizations are primarily outside of the U.S. and Government Contractors are primarily located in the U.S.

Of U.S. organizations, the services and manufacturing industries reported most appraisals.

Compared to the early reports of the SW-CMM maturity profile, the early data reflects a relatively more mature CMMI profile.

Additional information and charts will be added to this briefing as more appraisals are reported and therefore more data is available to support these breakdowns.
Terms Used in this Report

Company
- Parent of the appraised entity
  A company can be a commercial or non-commercial firm, for-profit or not for-profit business, a research and development unit, a higher education unit, a government agency, or branch of service, etc.

Organization – a.k.a. Appraised entity
  The organization unit to which the appraisal results apply. An appraised entity can be the entire company, a selected business unit, units supporting a particular product line or service, etc.

Offshore
- Appraised entity whose geographic location is not within the United States. The parent of the appraised entity may or may not be based within the United States.
Report your Appraisal Results to the SEI

The briefing is only possible due to the cooperation of organizations and individuals sending in their appraisal results to the SEI

In order to provide this information and service in the future, it will depend on this continued cooperation

Please visit:

http://www.sei.cmu.edu/sema/report.html

for forms, information, and instructions on how to report appraisals to the SEI
Contact Information

Please visit:

http://www.sei.cmu.edu/sema/profile_about.html

and review the information provided before contacting:

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